

6. MR. H. S. GILROPP  
11. H.M. PROD. Co.  
STANBROOK, N.J. 07874

12-13-7-4390

J. 201-347-1200

10. H. S. GILROPP 10TH  
SMITH A. H. GILROPP Co.  
1414 EAST LINDEN AVE.  
LINDEN, N.J.

WORLD TRADE CENTER

N.J. 212-404-5265

EXTERIOR WALL, SPANDRELS AND EXTERIOR COLUMN INSULATIONS

N.J. 201-925-2100

THERMAL CONDUCTIVITY AND HEAT TRANSMISSION COEFFICIENTS

Value Based on Wall & Column Design As of 5/5/66

Drawing A-A-314

"U" - Coefficient Transmission - BTU/HR-SF-OF

Fireproofing Material	Conductivity (k) BTU HR-SF-8F-IN	At Sides of Column		At Outside Face of Column (W/Air Space)		
		With 1 5/8" F. P. & Air Space	1 5/8" F. P. + 3/8" Urethane No Air Space	With 1 5/8" F. P.	1 5/8" F. P. + 3/8" Urethane	With 2" F.P. and 3/8" Polyurethane
1. Sprayed Mineral Fiber (Spraycraft)	.26	0.135	0.116	.136	.104	.092
2. Sprayed (Cementi- tious) Vermiculite (Mono- kote)	.75	0.302	.221	.302	.182	0.167
3. Laminated Gypsum Board (U.S.G. FireCode)	1.11	0.385	.261	.385	.209	.195
4. Concrete (L.W. 100 PCF)	3.57	0.630	.353	.625	.264	.256
5. Vonco	.38	0.185	.151	.185	.131	0.116
6. Cafco	.27	0.140	.119	.140	0.107	0.093

Notes:

1. Fireproofing for inside face of column is assumed to be 1 3/8" gypsum plaster having conductivity of 1.56 and the overall transmission coeff. of .396 between the room and column steel.
2. Inside still air film resistance is taken as .68
3. Outside air film resistance is taken as .17
4. Air space resistance is taken as .97

PLAINTIFF'S  
EXHIBIT

PX 450

NO. 11-11-66

WTCL-457-P

WORLD TRADE CENTER

3/8" URETHANE  
No Air Space

JUNE 24, 1966

EXTERIOR WALL, SPANDRELS AND EXTERIOR COLUMN INSULATIONS

THERMAL CONDUCTIVITY AND HEAT TRANSMISSION COEFFICIENTS

Value Based on Wall & Column Design As of 5/5/66

Drawing A-A-314

1 5/8" F.P. +  
3/8" URETHANE

WITH 1 5/8" F.P.  
& AIR SPACE

5 B13  
10-738  
856

Fireproofing Material	Conductivity (k) BTU HR-SF-DF-IN	"U" - Coefficient Transmission - BTU/HR-SF-DF				
		At Sides of Column		At Outside Face of Column (w/Air Space)		
		With 1 5/8" F.P.	With 3/8" Polyurethane Included	With 1 5/8" F.P.	F.P. With 3/8" Polyurethane Included	With 2" F.P. and 3/8" Polyurethane
1. Sprayed Mineral Fiber (Spraycraft)	.26	<del>0.131</del> 0.135	<del>0.127</del> 0.116	.136	.104	.092
2. Sprayed (Cementitious) Vermiculite (Monokrete)	.75	<del>0.429</del> 0.302	.221	.302	.182	<del>0.167</del> 0.167
3. Laminated Gypsum Board (U. S. G. Fire Code)	1.11	<del>0.593</del> 0.385	.261	.385	.209	.195
4. Concrete (U.N. 100 PCF)	3.57	<del>1.62</del> 0.630	.353	.625	.264	.256
5. Veneer	.38	<del>0.227</del> 0.185	.151	.185	.131	<del>0.127</del> 0.116
6. Cafco	.27	<del>0.161</del> 0.140	.119	.140	<del>0.107</del> 0.107	<del>0.093</del> 0.093

192-49

Notes:

1. Fireproofing for inside face of column is assumed to be 1 3/8" gypsum plaster having conductivity of 1.56 and the overall transmission coeff. of .396 between the room and column steel.
2. Inside still air film resistance is taken as .68
3. Outside air film resistance is taken as .17
4. Air space resistance is taken as .97
5. Conductivity of polyurethane is taken as .17

NC:rt,dd

PRELIMINARY  
STUDY

Inside surface =  $\frac{12}{68} = .176$   
 Outside surface =  $\frac{17}{17} = 1.0$   
 Air space =  $\frac{1}{17} = .059$   
 Total =  $.176 + 1.0 + .059 = 1.235$   
 U =  $\frac{1}{1.235} = .81$

WTC - EXTERIOR WALL INSULATIONS

SPANDRELS AND EXTERIOR COLUMNS

THERMAL CONDUCTIVITY AND HEAT TRANSMISSION COEFFICIENTS  
(In Order of Max. Thermal Reduction)

VALUES BASED ON WALL & COLUMN DESIGN

As of May 5, 1966

DECLASSIFIED ON 02-02-2000 314

MATERIAL	CONDUCTIVITY (K) BTU HR-SF-°F-IN (Resistance) 1/K	RESISTANCE (R) HR-SF-°F-IN BTU (Conductance) 1/R	"U" - COEFF. TRANSMISSION - BTU/HR-SF-°F Thermal Reduction Value				
			At Sides of Column		At Outside Face of Column (w/Air Space)		
			With 1-5/8" F.P.	With 3/8" Polyurethane Included	With 1-5/8" F.P.	With 3/8" Polyurethane Incl.	With 2" F.P. and 3/8" Polyurethane
1. Sprayed Mineral Fibre (Spraycraft) or Gafco	<del>0.04</del> .26	<del>0.25</del> 3.85	<del>0.25</del> .141	<del>0.20</del> .102	<del>0.19</del> .124	<del>0.16</del> .097	<del>0.14</del> .086
2. Sprayed (Cementitious) Vermiculite (Monokote)	<del>0.08</del> .75	<del>0.12</del> 1.33	<del>0.27</del> .332	<del>0.26</del> .192	<del>0.24</del> .125	<del>0.20</del> .162	<del>0.18</del> .138
3. Laminated Gypsum Board (U. S. G. Fire Code)	<del>0.15</del> 1.11	<del>0.67</del> .9	<del>0.29</del> .433	<del>0.39</del> .222	<del>0.46</del> .305	<del>0.27</del> .183	<del>0.25</del> .172
4. Concrete (L.W. 100 PCF)	<del>0.30</del> 3.37	<del>1.67</del> .28	<del>0.37</del> .767	<del>0.44</del> .285	<del>0.53</del> .44	<del>0.30</del> .224	<del>0.20</del> .218
5. Gypsum Plaster	<del>0.50</del> 1.56	<del>0.20</del> .64	<del>0.05</del> .200	0.53 .188	0.60 .167	0.32 .312	0.31 .323
5. Gypsum Plaster Inside	.34	2.94	.195	.137	.164	.112	.108
6. Gypsum Plaster	.27	3.7	.146	.11	.128	.097	.088

Definition of U and physical arrangement need clarification

192-49

WTC - EXTERIOR WALL INSULATION

SPANDRELS AND EXTERIOR COLUMNS

THERMAL CONDUCTIVITY AND HEAT TRANSMISSION  
(In Order of Max. Thermal Reduction)

VALUES BASED ON WALL & COLUMN DESIGN

As of May 5, 1966

DRAWING A-A-303

overall heat transmission coefficient?

MATERIAL	<i>K</i> (Resist- ivity) "K"	(Conduct- ance) "C"	"U" Thermal Reduction Value				
			At Sides of Column		At Outside Face of Column (w/Air Space)		
			With 1-5/8" F.P.	With 3/8" Polyurethane Included	With 1-5/8" F.P.	With 3/8" Polyurethane Incl.	With 2" F.P. and 3/8" Polyurethane
Sprayed Mineral Fibre (Spraycraft or Cafco)	0.04	0.24	0.23	0.20	0.19	0.16	0.14
Sprayed (Cementitious) Vermiculite (Monokote)	0.06	0.36	0.34	0.26	0.24	0.20	0.18
Laminated Gypsum Board (U. S. G. Fire Code)	0.15	0.90	0.79	0.39	0.46	0.27	0.25
Concrete (L.W. 100 PCF)	0.30	1.80	1.37	0.41	0.53	0.30	0.29
Gypsum Plaster	0.50	3.00	2.05	0.51	0.60	0.32	0.31

Source of these values and their clear definition is important

QTH 15°  
P. P. &  
AIRSPACE

WORLD TRADE CENTER

تاریخ : ۲۵.۱.۷۷

## THERMAL CONDUCTIVITY AND HEAT TRANSMISSION COEFFICIENTS

192-49

NC: rt, dd